Economic Impacts *of* Invasive Species *in* CA Agriculture

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Invasive Species
Crop Losses *and* Related Control Costs

	Percent Invasive	Percent Loss	Crop loss ($ billion)	Control cost
Weeds	73%	12%	23	$3 billion
Insects & mites	40%	13%	14	$500 million
Plant pathogens	65%	12%	21	$500 million
Total		37%	58	$4 billion

Source: Pimentel, et al., 2000. BioScience (50:1),

Economic Concepts

- **Public good** – Consumption by one person does not preclude or make more expensive consumption by another. Example: national defense
- **External cost** – Occurs when producers or consumers do not incur the full cost of their actions.
- Example: Pesticide pollution of a stream

MARKET VS. POLICY SOLUTIONS

- **Market solution** – may be industry wide. Groups of individuals agree to change behavior for common good.
- **Public Policy Action** – Public good characteristics point to market failure but not the appropriate form of government action.
- Most pest management regulation of ag are related to environmental concerns.

POLICY OPTIONS *FOR* INVASIVES

- **Exclusion** or b**order measures** – prohibit entry into the country or a region of the country.
- **Containment** – limit spread once the pest is established
- **Eradication** – eliminate a pest from a region.
- **Monitoring** – outbreaks and movement

ANIMAL *AND* PLANT INSPECTION SERVICE (APHIS)

- Charged with protecting the US against entry of new pests and diseases primarily of agricultural animals and plants.
- Border rules for imported farm products
- Control of accidental entry of farm pests brought to the US by travelers.
- Pest eradication programs.
- Now part of the Dept. of Homeland Security

Private Sector Management of Established Infestations

Plant breeding

Crop rotation

Cultural control

Solarizatoin

Biological control

Resistance

PARTIES IMPACTED *BY* INVASIVE SPECIES

- Agricultural industries
  - Growers – lower income, higher costs, higher market price
  - Marketing sector – restrictions on exports
  - Input suppliers – demand for labor, fuel, seed, and other inputs may increase or decrease
- Consumers – increase in price
- Taxpayers – public funding for programs

RESEARCH EXAMPLES

Daniel Sumner, Editor.2000. Exotic Pests and Diseases, Iowa State Press.

- "Risk assessment of plant - parasitic nematodes", Ferris et al.

- "A rational regulatory policy: the case of Karnal bunt", Glauber and Narrod.

RISK ASSESSMENT *OF* PLANT PARASITIC NEMATODES *IN* CA

Total value of production	$30 billion
Number of top 10 commodities impacted	7
Value of affected commodities	$18 billion
Percent of total value	61%

Major crops impacted: Grapes, nursery, lettuce, citrus, cotton, strawberries, alfalfa

GROWER COSTS *AND* BENEFITS *OF* ERADICATING NEMATODES

Nematode	Crop	Costs $/Year	Benefits $/Year
Rice foliar	Rice	$473	$320
Reniform	Cotton	$473	$163
	Wine grapes	$465	$170
	Oranges	$401	$152
Burrowing	Oranges	$393	$150

TOTAL COST *OF* WIDESPREAD NEMATODE ESTABLISHMENT 1,000 ACRES

Nematode	Crop	One pest $ million	Both pests $ million
Sting	Cotton	1	
Reniform	Cotton	2	3
Golden	Tomato	2	
Burrowing	Tomato	2	2

KARNAL BUNT DISEASE BRIEF HISTORY

1982 – Wheat disease found in Mexico.

1988 – USDA risk assessment found risk to be high due to border proximity.

1991 – USDA assessment; recommends quarantine in the event of an introduction.

1996 – Detection in AZ. USDA emergency quarantine in AZ, CA, NM, and TX.

IMPACT *OF* REDUCED EXPORTS *FROM* AN OUTBREAK *OF* KARNAL BUNT

Item	Unit	0%	10%	25%
Exports	Mil. Bu.	1,200	1,080	900
Price	$/bushel	3.85	3.63	3.29
Income	$ million	11,358	10,813	8,146
Grower losses	$ million	--	-545	-1,397
Consumer gains	$ million	--	284	747
Net impact	$ million	--	-261	-650

COSTS DUE *TO* KARNAL BUNT REGULATIONS

Item	Cost ($ million)
Plowdown of infected fields	1.2
KB + grain diverted to cattle feed	4.2
Railcar cleaning and disinfecting	.6
Restrictions on seed movement Loss in value of seed	6.0
Millfeed treatment KB - negative grain value loss	28.0

QUARANTINE BENEFITS *AND* COSTS ($ MILLION)

	Reduction in Exports	
	10%	25%
Benefit over 10 years	$1,979	$5,095
Cost: Plowdown of fields	- 1.2	- 1.2
Cost: Diversion to cattle feed	- 4.2	- 4.2
Net benefit	$1,973	$5,090

ADDITIONAL COSTS *AND* BENEFITS *OF* ALTERNATIVE QUARANTINE OPTIONS

		Added Benefits Reduction in Exports	
	Added Cost	10%	25%
	--------- $ million ----------		
Railcar cleaning	.6	115	285
Restrictions on seed movement	6.0	3	7.5
Millseed treatment	28	.1	.4